Surname	
Other Names	
Candidate's Signature	

GCSE 9 - 1 Questions

Sequences 2

Calculator Allowed

INSTRUCTIONS TO CANDIDATES

- Write your name in the space provided.
- Write your answers in the spaces provided in this question paper.
- Answer ALL questions.
- Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.
- You should have a ruler, compass and protractor where required.

Total Marks :

1) Look at the following expressions:

Expression 1: $(1 + 2) \div 3$

Expression 2: $(3 + 4 + 5) \div 4$

Expression 3: $(6 + 7 + 8 + 9) \div 5$

Expression 4: $(10 + 11 + 12 + 13 + 14) \div 6$

(a) Calculate the value of each expression.

Expression 1 = _____ Expression 2 = _____

Expression 3 = _____ Expression 4 = _____

(b) Write down Expression 5 in this pattern and calculate its value.

Ans: Expression 5: _____ = _____

(4 marks)

2) For each of the following sequences, write down the next term in the space provided.

(i) 1, 4. 9, 16, 25, ____ (1)

(ii) 8100, 2700, 900, 300, 100, ____ (1)

(iii) 1, 2, 4, 8, 16, 32, ____ (1)

3) a) Complete the sequence:

7, 10, 13, 16, _____, _____.

b) The *n*th term for the sequence above is $3n + 4$. Find the 20th term of the sequence.

(2)

(c) Write down the next two terms of the following sequences:

(i) 1, −4, 9, −16, 25, _____ , _____

(1)

(ii) 27, 9, 3, 1, _____ , _____

(1)

(iii) 0.01, 0.002, 0.0003, _____ , _____

(1)

(Total: 8 marks)

4) a) Fill in the blank spaces in the sequence:

6, 9, 12, 15, _____, _____.

b) The *n*th term for this sequence is $3n + 3$. Use this formula for the *n*th term to find the 10^{th} term of the sequence.

(4 marks)

5) a) Write down the next two terms in each number pattern:

(i) 17, 22, 27, 32, _____, _____.

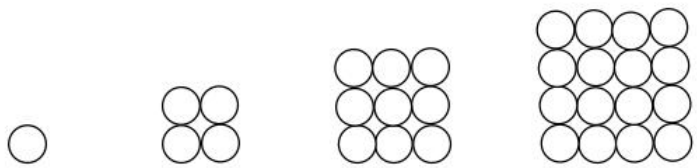
(ii) 24, 22, 20, 18, _____, _____.

b) Use the formula $V = 5n + 12$ to find the value of V when $n = 30$.

_____

(6 marks)

6) Shapes containing equal circles follow the pattern as shown.



Write down the number of circles in:

a) the next shape _____ b) the 10^{th} shape _____

c) the n^{th} shape _____

(5 marks)

7) (a) Find the first three terms of the sequence whose nth term is given by:

nth term = $7n - 5$

Ans: _____, _____, _____

(b) Find an expression for the nth term of the sequence:

17, 21, 25, 29,...

Ans: _____

(4 marks)

8) For the sequence 4, 11, 18, 25, ...

(a) Write down the 7^{th} term.

(1)

(b) Write down the expression for the n^{th} term.

(2)

(c) Calculate the value of the 100^{th} term.

(1)

(Total: 4 marks)

9) The first 4 terms of a sequence are: 22, 17, 12, 7, ...

(i) Write down the next 2 terms in the sequence.

2 marks

(ii) Write down a formula for the n^{th} term of this sequence.

2 marks

10) The first term of a sequence of numbers is 29.
The term-to-term rule of this sequence is "add 7".

(a) Malcolm says, "No number in this sequence is a multiple of 5".
Give an example to show that Malcolm is wrong.

(2)

(b) Work out the value of the n^{th} term of this sequence.

(2)

(Total: 4 marks)

11)(a) Find an expression for the nth term of the sequence:

17, 21, 25, 29,...

Ans: _____

(b) Show that 105 is a term of this sequence.

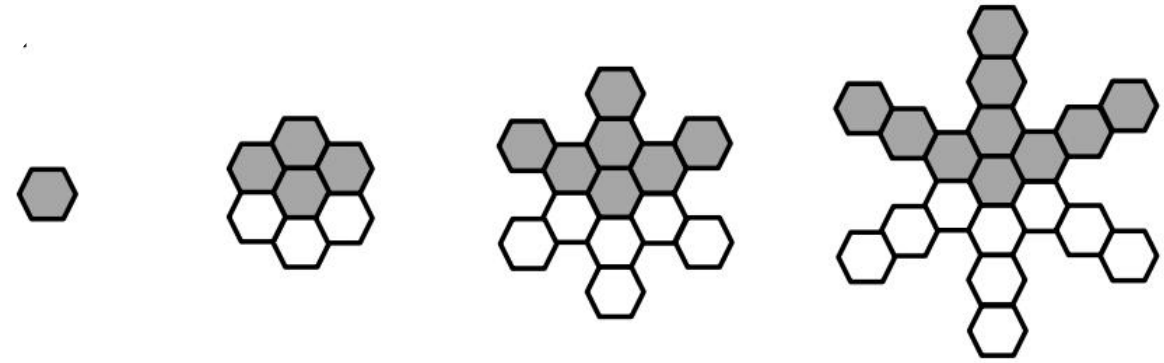
(3 marks)

12)Fill in the missing terms in the following sequences:

	TERMS of the sequence							
	1st	**2nd**	**3rd**	**4th**	**5th**		**10th**	***n*th**
Sequence A	2	4	6	8	10			
Sequence B	1	4	9	16	25			
Sequence C	3	6	9	12	15			
Sequence D	4	7	10	13	16			

8 marks

13)



Shape 1 Shape 2 Shape 3 Shape 4

a) For the pattern above, complete the following table.

Shape Number	1	2	3	4	5
Grey hexagons	1	4	7	10	
White hexagons		3	6	9	
Total number of hexagons		7	13	19	

[3]

b) Write down an expression for the n^{th} term, where n is the **total** number of hexagons.

Answer .....[2]

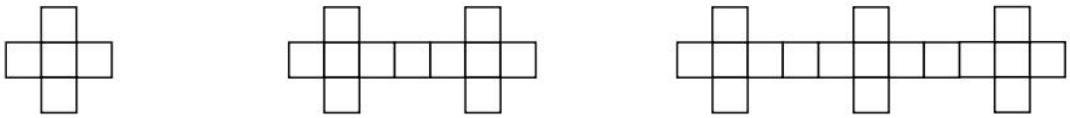
c) Which shape number has a total of 115 hexagons?

Answer .....[2]

d) Explain why, in the pattern above, there is no shape number with 299 **white** hexagons.

[2]

14) Clive is designing a pattern. Each section of the pattern is made of squares as shown below.



1 section
5 squares

2 sections
11 squares

3 sections

(a) Complete the table:

Number of Sections (s)	1	2	3	4
Number of squares (r)	5	11		

(b) Write down a formula for the number of squares r in terms of the number of sections s.

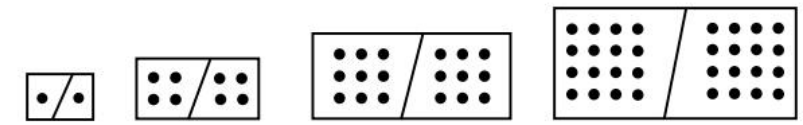
Ans: $r =$ _____

(c) Clive used 143 squares. **How many sections** did he make?

Ans: _____sections

(7 marks)

15) The shapes below represent the first four terms of a sequence.



Shape 1 **Shape 2** **Shape 3** **Shape 4**

a) Fill in the following table:

Shape	1	2	3	4	5
Number of Dots	2		18		

b) Find the number of dots in shape 10.

Ans. _____

c) Choose the expression which gives the number of dots in shape n.

A. $3n + 2$	B. $5n + 3$	C. $2n^2$	D. $n^2 + 2$

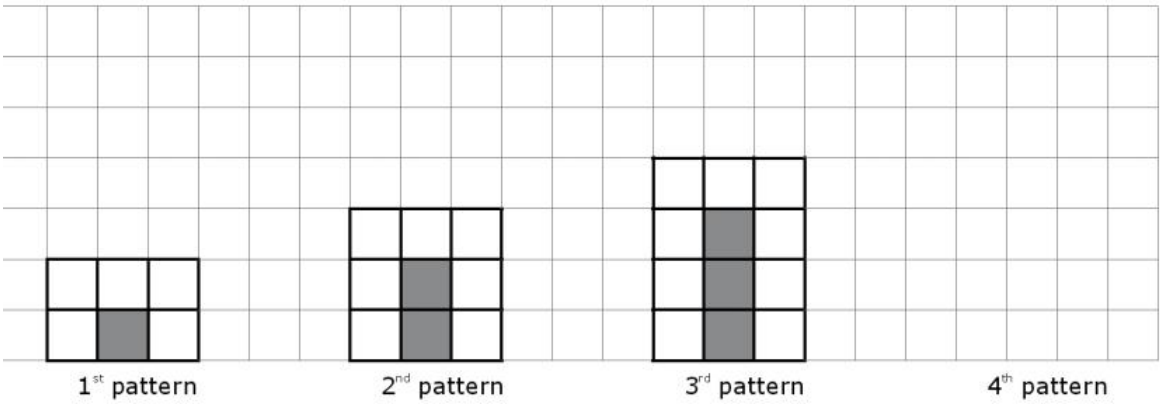
Ans. _____

d) Is there a shape in the sequence having 154 dots? Give a reason for your answer.

(6 marks)

16) A sequence of patterns is made up of grey squares and white squares.

The diagram below shows the first three patterns, drawn on squared paper.



(a) On the diagram above, draw the 4th pattern of this sequence.

(1)

(b) What is the number of grey squares in the 100th pattern?

(1)

(c) Calculate the **total** number of squares in the 100th pattern.

(2)

(d) Find an expression, in terms of n, which represents the total number of squares in the n^{th} pattern.

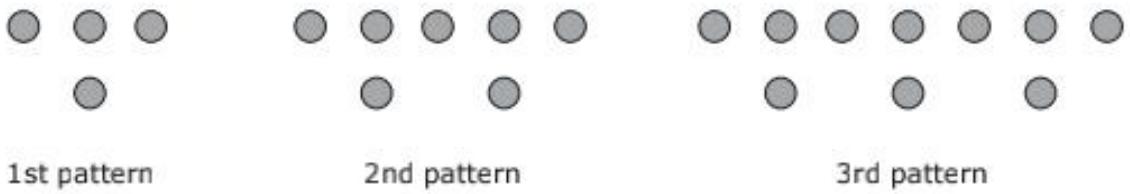
(2)

(e) Is there a pattern in this sequence with a total of 261 squares? Show your working.

(2)

(Total: 8 marks)

17) The figure shows a sequence of patterns with counters.



1st pattern 2nd pattern 3rd pattern

a) How many counters are there in the 4th Pattern?

Answer .....[1]

b) Find an expression, in terms of *n*, which represents the number of counters in the *n*th pattern.

Answer .....[2]

c) How many counters are there in the 11th pattern?

Answer .....[1]

d) Is there a pattern in this sequence with 195 counters? Show your working.

Answer .....[2]

18) (a) The table below shows the first five terms of Sequence A.

(i) Complete the table.

Sequence A			
1st term	1	=	1
2nd term	1 + 2	=	3
3rd term	1 + 2 + 3	=	
4th term	1 + 2 + 3 + 4	=	
5th term		=	

(2)

Each term of Sequence A can also be worked out using the formula

$$n^{\text{th}} \text{ term} = \frac{1}{2}n(n+1)$$

(ii) Use this formula to check the answer obtained for the 5th term in the table above.

(2)

(iii) Which term is equal to 120?

(3)

(b) The table below shows the first five terms of Sequence B.
Complete the table.

Sequence B			
1st term	1^3	=	1
2nd term	$1^3 + 2^3$	=	
3rd term	$1^3 + 2^3 + 3^3$	=	
4th term	$1^3 + 2^3 + 3^3 + 4^3$	=	
5th term		=	

(2)

(c) By comparing the terms in the two sequences, write down the formula for the n^{th} term of Sequence B.

(2)

(Total: 11 marks)